Reconfigurable Miniature Transponder for Multimode L, S, X band Space Communication, Phase I

Completed Technology Project (2007 - 2007)

Project Introduction

Long Range Space RF Telecommunications seeks solutions for long range missions using modular deep space transponders with smaller size and lower power components. While reconfigurable signal processing is typically performed in FPGA's, RF hardware is not nearly as agile, but if it were (small high Q filters, broadband actives) power savings and compact flexible RF radio architectures would be possible. As applied to an identified existing S and X band TTC transponder, the innovation described herein applies to EW and broadband RF channelizers, and commercial Software Defined Radios. The proposed innovation seeks to demonstrate that a universal, reusable and digitally programmable RFIC combining avionics proven MEM's and SiGe BiCMOS (130~180 nm) technology is that solution. The effort will demonstrate the sufficiency of a RF CMOS switch for the application described. On chip RF primitive circuits are combinatorial configured along with on or off chip ruggedized piezo film MEM's filters/resonators, providing a practical and reliable RF macro block configurable for receive or transmit modes from <100 MHz to >8 GHz. Primitive RF building blocks are electronically reconnected on chip to enable such RF macro functions as RF up/downconverter, IQ mod/demodulator, and image reject mixer; digital I/O and bias circuitry is included.

Anticipated Benefits

Potential NASA Commercial Applications: There is a great need within both DoD and commercial space for lower cost SGLS hardware with this enabling technology. This technology and product will benefit new commercial space projects such as communications and imaging. Space platforms, both LEO and GEO telecommunication satellites, such as Intelsat, Direct TV, XM radio, and earth sensing applications e.g. (NOAA and SPOT). This technology and products will also address DoD space communications needs. This includes Air Force, NRO, MDA, and NOAA projects. Example programs may include T-Sat, ANGELS, TacSat series, AEHF, and STSS.

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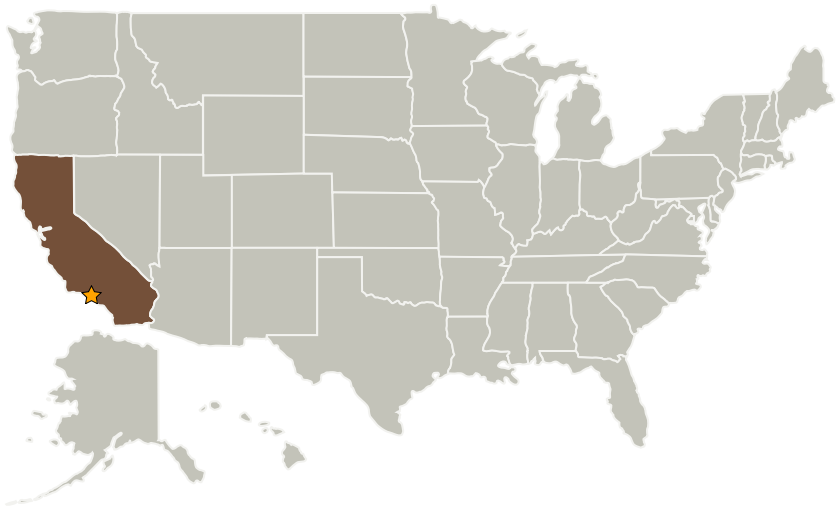
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Space Micro, Inc.	Supporting Organization	Industry	San Diego, California

Primary U.S. Work Locations
California

Project Transitions

January 2007: Project Start

July 2007: Closed out

Closeout Summary: Reconfigurable Miniature Transponder for Multimode L, S, X band Space Communication, Phase I Project Image

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Dave J Strobel

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.3 Atmospheric Characterization and Mitigation